

CONTRACT FILE*Office Memorandum* • UNITED STATES GOVERNMENT

TO : Chief, TISD

31 March 1960

FROM : [REDACTED] TD & SS

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SUBJECT: Proposed Investigation of Chemical Mixing, Storing and Replenishment

1. Pursuant to your directive of 30 March 1960, a study will be initiated by TD & SS on the problem of central chemical mixing, storage, distribution and replenishment. It is proposed by the undersigned that this study be divided into three phases, numbered chronologically in the degree of their complexities. Phase I of this study would result in a proposal and cost estimate for the equipment and services necessary to install a central chemical mixing and storage system. Four or five types of developer working solutions would be centrally mixed and stored for distribution to the various darkroom processing stations. In addition, one standard fixing and hardening solution would be mixed, stored, and piped to these stations. The water used in connection with these solutions would come from the local water supply and would be filtered and demineralized by commercially available filtration equipment. The solutions would be piped by stainless steel (type 316) tubing of appropriate diameters to the various processing stations by gravity feed. These solutions would be discarded at the several processing stations after normal use. It would be prudent to keep fairly accurate records of the number of square feet or square inches of film and/or paper processed in any given volume of these solutions in order to avoid the exhaustion points. The principal advantage of Phase I would be that the solutions would be uniform from day to day and transportation through the corridors would be eliminated and some economy would be achieved through the use of appropriate values of these solutions.

2. Phase II: Phase II of this study would include all of the items listed above in Phase I and in addition, a facility for returning the partially used chemical to the central storage for appropriate sampling by chemical titration so that proper replenishment could be effected; also, these solutions would be filtered of their ordinary precipitants and every means would be employed to keep oxidation at a minimum. The principal advantage of Phase II is that considerable economy would be achieved by reclaiming and

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restoring the working solutions from the various darkroom stations rather than discarding them at the stations when they are only partially exhausted. Such a system is employed by several photo finishing firms in the United States and in particular, the installation at [REDACTED] It is entirely feasible to operate such a system indefinitely without ever completely replacing the original solutions. There is also some economy to the reclamation of the dissolved silver salts from the fixing and hardening bath. However, the principal advantage to silver recovery is to extend the life of the working solution and not the monetary return from the reclaimed silver. It is entirely feasible that such a system described in Phase II would pay for itself in a period of 5 or 6 years of operation, estimating that most developer solutions cost approximately \$1.00 per gallon for the ingredients alone, plus the cost of mixing these ingredients into a working solution. A considerably number of dollars are flushed down the drain each day at this facility.

Another major advantage of such a system is that all working solutions are maintained at a constant and appropriate level of activity and uniformity and that products generated by these solutions likewise will be uniform.

3. Phase III of this study would include all of the items mentioned in Phase I above and would substitute electronic sampling of all working solutions returned to central storage. Electronic sampling has many advantages over chemical titration, the principal advantage being that the sampling is done in a much higher frequency and the reconstituted elements are added back to the original solutions in smaller quantities, but more frequently, and the possibility of disturbing the delicate chemical balance is considerably reduced.

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These cost estimates are very approximate and are intended to serve only as a guide for consideration. It will be necessary to visit several photo installations in the United States to obtain the latest information on the instrumentation and methods. It would be advisable to make a detailed study of the installation at

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[REDACTED] in connection with Phase II of this study. The undersigned visited this installation in 1957 for the purpose of installing some electronic printing equipment and had only a cursory glance at the chemical storage and recirculation system in use there, regarded as one of the best of its type in the world.

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